Investment of Slovenian farms in the transition context

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ABSTRACT

This paper investigates the investment decisions of Slovenian farms during the transition and adjustment period to European Union (EU) membership and in particular whether these decisions were constrained by financing availability. Results from a standard and an augmented accelerator models indicate that farms' investment decisions was based on market opportunities during the period 1994-2003, but that the decisions were constrained by financing availability.

Keywords: farms, investment, accelerator model, financial constraint, Slovenia.

1 INTRODUCTION

Investments provide opportunities to increase the farming assets or to replace the existing capital by more productive one, which is important to increase farm efficiency, competitiveness, survival and prosperity. This is even more crucial in the context of adjustment to market-based conditions and of preparation for competition within the Single European Market (SEM). From a policy point of view it is therefore important to understand how the demand for investment by farms is determined, in order to facilitate it.

The first question is whether farmers, during the transition process, took investment decisions based on market conditions that were according to profitable opportunities. Indeed, soft budget constraints prevailing under the communist regime might have led farmers to take biased decisions, and adjustment to a free market might be slow. The second issue is whether investment decisions have been fully implemented or whether they were constrained by reduced financial availability. The increase in input prices and decrease in output prices (the "scissor effect") and the imperfectly functioning credit market might have caused a lack of financing for farmers. This situation was for example reported for Polish (LATRUFFE, 2005), Hungarian (FERTÖ et al., 2006), and Russian farms (BEZLEPKINA AND OUDE LANSINK, 2003).

Investments by Slovenian farms have not been investigated so far, although the country has an interesting specific history of communism and transition (no collectivisation, prevalence of family small-scale farming, influence of Western countries). Therefore, this paper adds to literature investigating farm investment behaviour in Slovenia, which is chosen for the empirical analysis due to four main reasons. First, so far there is no study to investigate determinants of investments of Slovenian family farms, which dominate in the country's farming

structures and face structural, efficiency and competitiveness problems. This motivated our research to investigate possible similarities, but particularly country peculiarities and differences. Second, on average Slovenian family farms are by their land size among the smallest in Europe. Thus, it is interesting to investigate their investment activity, which is one of the key elements for farm restructuring of input and output mix, implementation of new production methods and technology used, and is crucial for farms expansion and growth. Third, to investigate farm investment decisions, we use an original Slovenian Farm Accountancy Data Network (FADN) sample for the period 1994-2003. During the analyzed period Slovenia was adjusting its agriculture towards regional integration and European Union (EU) membership. Therefore, one might expect that adjustments require additional investments and it is important to know the driving forces for such investments, but that the transitional context might limit the financing availability to cover investment expenditures. Finally, we derive policy implications, which are relevant for Slovenian agriculture, but also for other countries in the region with similar farming structures based on the prevailing family based small-scale farms. The rest of the paper is structured in the following way. In the next section, Section 2, we present some main stylized facts on Slovenian agriculture focusing on real agricultural incomes and main aggregates of economic accounts for agriculture. Section 3 presents the methodology and data used, whereas the final section, Section 4, explains the econometric empirical results and derives main managerial and policy implications of significance for farm investment decisions within a borderless SEM.

2 INCOMES AND INVESTMENTS IN SLOVENIAN AGRICULTURE

Own financial resources are a main source of financing gross fixed assets of enterprises, companies and organisations in Slovenian agriculture. In 2003 own financial resources represented around 65 percent of the financing of gross fixed assets (SORS, 2005, p. 12). Among other sources of finance are financial credits and leasing (27 percent), joint assets (4 percent), special assets funds (3 percent), and grounds and similar sources of finance without compensation of fixed assets (1 percent). Measures of agricultural policies have targeted investments by agricultural households and other economic subjects that are important for rural development. Supports to investments and for restructuring of agriculture have been the most important among measures of rural development policy (MAFF, 2006).

These stylized facts indicate the crucial role of farming incomes and other agricultural households' incomes that are used for investments in agriculture. Due to this, we first present basic features in Slovenian agriculture in terms of structure of agricultural incomes by intermediate consumption and value added, and employment (Table 1). Except in 1999, agricultural incomes in Slovenian

agriculture have increased in nominal terms, but not in real terms. Final agricultural output in real terms (nominal basic prices deflated by consumer price index with the 1995 base year) has experienced cyclical oscillations with peaks in 1996, and to a lesser extent in 2002. Intermediate consumption is a more important component of final agricultural output than value added. Some annual oscillations in patterns of development and in income structures can be seen, with particularly a decline in value added in 2003. The importance of Slovenian agriculture in employment is revealed by a rather higher proportion of employment in the Slovenian economy, as still around 10 percent of the labour force is recorded to be employed in agriculture.

Table 1: Agricultural incomes (in billion SIT in 1995 prices) and employment in Slovenian agriculture, 1995-2005

	Final agricultural output (AO)	Intermediate consumption (% of AO)	Value added (% of AO)	Employment (1,000 employed)
1995	150.3	54.8	45.2	110.6
1996	157.9	59.2	40.8	111.1
1997	156.8	55.0	45.0	114.3
1998	145.7	53.6	46.4	111.3
1999	136.6	54.1	45.9	108.6
2000	136.5	56.1	43.9	107.8
2001	132.9	59.3	40.7	107.1
2002	140.2	52.9	47.1	106.0
2003	122.9	59.4	40.6	95.6
2004	138.0	55.2	44.8	90.2
2005	132.4	54.6	45.4	90.8

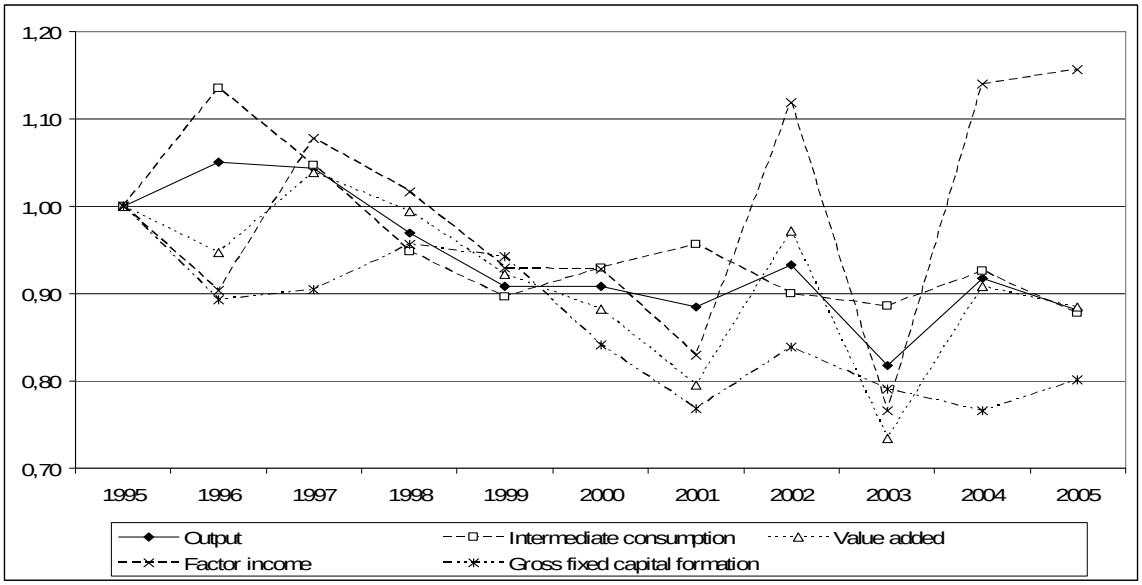
Note: Slovenian tolar (SIT) was the Slovenian national currency between October 1991 and up to 1st January 2007.

Source: SORS (2006) Statistical Yearbook of Slovenia 2006.

Figure 1 presents developments in main aggregates of economic accounts for agriculture in real terms (1995 prices, 1995=1). Real agricultural output and its two main components (real intermediate consumption and real value added) tend to decline. An even sharper decline is seen for real gross fixed capital formation. Some recovery occurred only for factor incomes.

Gross fixed capital formation is the main element of gross capital formation. The difference between both formations represents changes in inventories and acquisitions minus disposals of valuables (Table 2). The majority of gross fixed capital formation in agriculture consists of non-agricultural products (more than 75 percent), the rest being agricultural products. Among tangible fixed assets, the most significant components are buildings and construction works (more than 52 percent) and producers' durable goods (more than 42 percent). Breeding stocks and orchard developments count only around 0.5 percent of tangible fixed assets.

Figure 1: Developments in real agricultural output and its structures, and gross fixed capital formation 1995-2005 (1995=1)



Source: Own calculations from SORS (2006) Statistical Yearbook of Slovenia 2006.

Table 2: Structure of gross capital formation in Slovenian agriculture (%), 2000-2005

	2000	2001	2002	2003	2004	2005
Gross capital formation	100.0	100.0	100.0	100.0	100.0	100.0
Gross fixed capital formation	95.4	100.0	96.8	94.2	91.4	93.8
• Tangible fixed assets	91.7	95.8	92.8	91.0	88.3	90.6
• Intangible fixed assets	3.5	3.7	3.7	2.9	2.8	2.8
• Increase of the value of non-produced	0.2	0.5	0.3	0.3	0.4	0.4
• Non-financial assets	0.0	0.0	0.0	0.0	0.0	0.0
Changes in inventories	4.5	-0.2	2.7	5.8	8.5	6.2
Acquisitions minus disposals of valuables	0.1	0.2	0.4	0.1	0.0	0.1

Source: SORS (2006) Statistical Yearbook of Slovenia 2006.

3 METHODOLOGY AND DATA USED

The accelerator model with random effects is applied to Slovenian Farm Accountancy Data Network (FADN) data for the period 1994-2003, when Slovenia was adjusting its agriculture towards regional integration and European Union (EU) membership. The standard accelerator model (equation (1)) suggests that investment decisions are based on sales' growth (CLARK, 1917). In order to test for the presence of financing constraints on investment behaviour, a cash flow variable is introduced, leading to the augmented accelerator model (equation (2)) (FAZZARI et al., 1988).

$$\frac{I_t}{K_{t-1}} = \alpha_0 + \alpha_1 \frac{\Delta S_{t-1}}{K_{t-1}} + u_t \quad (1)$$

$$\frac{I_t}{K_{t-1}} = \beta_0 + \beta_1 \frac{\Delta S_{t-1}}{K_{t-1}} + \beta_2 \frac{CF_{t-1}}{K_{t-1}} + v_t \quad (2)$$

In our two investment models, three variables are used, each divided by the real value of total assets in the previous period *t-1* in order to control for size effects: gross investment to assets ($\frac{I_t}{K_{t-1}}$), change in real sales to assets ($\frac{\Delta S_{t-1}}{K_{t-1}}$), and farm income to assets proxying cash flow to assets ($\frac{CF_{t-1}}{K_{t-1}}$). Gross investment is calculated as the difference in real value of total assets between current period *t* and previous period *t-1*, plus real depreciation in the previous period *t-1*. Change in real sales is calculated as the difference in real value of total revenue between current period *t* and previous period *t-1*. Cash flow is proxied by real farm income in period *t-1*. In order to control for size effects, all variables are divided by. Table 3 presents their average yearly values for the FADN sample of 1994-

2003. Farm income to assets tends to increase slightly, whereas gross investment to assets and particularly change in real sales to assets have experienced variations by years over the analyzed period.

Table 3: Investment characteristics of Farm Accountancy Data Network (FADN) farms, 1994-2003

	Gross investment to assets $(\frac{I_t}{K_{t-1}})$	**Change in real sales to assets** $(\frac{\Delta S_{t-1}}{K_{t-1}})$	**Farm income to assets** $(\frac{CF_{t-1}}{K_{t-1}})$
1994-1995	0.2479	0.0108	0.0279
1995-1996	-0.2463	-0.0014	0.0301
1996-1997	0.0313	-0.0150	0.0710
1997-1998	0.0796	0.0734	0.0658
1998-1999	0.2258	0.0126	0.0875
1999-2000	0.4500	0.3718	0.0654
2000-2001	0.0433	-0.0617	0.1163
2001-2002	0.3644	-0.0467	0.0852
2002-2003	-0.1584	-0.0422	0.0868

Source: Own calculations based on data of Farm Accountancy Data Network (FADN) sample.

As panel data are available, random *vs*. fixed effects are tested employing the Hausman test. Despite account for potential size effects by dividing by the value of assets, the issue of heteroscedascity might still affect the econometric results. Therefore, in the estimation of the empirical models, the White robust estimator is used.

The sample used is an original sample of 13 production branches: as Slovenia is a small country, FADN returns for individual farms cannot be provided. Averages for production branches are thus available. Table 4 displays some basic characteristics of the whole sample per year in 1994-2003. Only family farms are included in the data, as Slovenian agriculture had not been collectivised.

Table 4: Structural characteristics of Farm Accountancy Data Network (FADN) farms, 1994-2003

	Total revenue (mio SIT)	**Utilised land (ha)**	**Labour (AWU)**
1994	2.50	12.39	2.02
1995	2.98	12.59	2.05

1996	3.16	12.14	2.29
1997	3.32	11.14	2.08
1998	3.99	10.98	2.26
1999	4.36	12.15	2.01
2000	7.39	15.89	2.31
2001	7.72	16.40	2.09
2002	7.51	21.50	5.57
2003	7.27	18.49	5.39

Note: AWU: Annual Working Units (1 AWU = 2,200 hours per year).

Source: Own calculations based on data of Farm Accountancy Data Network (FADN) sample.

4 RESULTS AND DISCUSSION

Econometric results of the standard accelerator indicate that the growth in sales was a major determinant of investment decisions for Slovenian farms during this period (Table 5). This suggests that farms' investment was based on market opportunities, ruling out the presence of soft budget constraints. As for the estimation of the augmented accelerator model, the positive coefficient for farm income gives evidence of the presence of financial constraints for some farms.

Table 5: Results of the standard accelerator model (random effects)

	Coefficient	**Robust standard error**	**p-value**
Constant	0.239	0.127	0.060
Growth of real sale	0.852	0.219	0.000
Hausman test		$Chi^2 = 0.05$	
R^2		0.45	
Number of observations		117	

Note: The dependent variable is the ratio of gross investment to assets; the explanatory variable is divided by assets. The low of value the Hausman test chi^2 indicates a random effects model.

Table 6: Results of the augmented accelerator model (random effects)

	Coefficient	**Robust standard error**	**p-value**
Constant	0.209	0.116	0.071
Growth of real sale	0.920	0.246	0.000
Real farm income	1.018	0.549	0.064
Hausman test		$Chi^2 = 0.25$	
R^2		0.48	

Number of observations	117

Note: The dependent variable is the ratio of gross investment to assets; the explanatory variable is divided by assets. The low of value the Hausman test chi^2 indicates a random effects model.

We have investigated determinants of investment decisions of Slovenian farms using a standard accelerator model and an augmented accelerator model. Due to the possible presence of the heteroscedascity, the White robust estimator was used, whereas the Hausman test confirmed that the random effect model is a preferable model.

We have found some variations in the analyzed variables over time. The farm income to assets experienced oscillations that are less substantial than the ones of the change in real sales to assets or the ones of gross investment to assets. The greater volatility in real sales and in gross investment than in farm income can be explained by some income support policies that mitigated market instabilities on farm incomes during the farm adjustments on regional integration and the EU membership.

The results of the standard accelerator model confirm a positive and statistically significant association between the decision of gross investment and the growth in real sales. In the augmented accelerator model this association becomes even more robust. Finally, the augmented accelerator model revealed a positive and significance influence of cash flow (proxied by farm income), suggesting that during the analyzed period (1994-2003) some farms of the FADN sample had been constrained in their investment behaviour by the low availability of own resources or of credit. These results clearly indicate that investments in Slovenian farms were driven by growth in real sales and by growth in real farm income. This finding is consistent with prevailing family farm household's investment behaviour, where behind farm growth are market sales and farm household's income ability to invest and expand. Further research deals with assessing whether specific conditions (such as a small farm size, preventing farms getting bank loans; or a specific type of farming, which is not highly supported) increased the negative effect of financing constraints on investments.

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